Infusing satellite Data into Environmental Applications (IDEA):

PM2.5 forecasting tool hosted at NOAA NESDIS using NASA MODIS (Moderate Resolution Imaging Spectroradiometer), GOES derived aerosol optical depth (AOD) and US EPA AIRNow PM2.4 network.

IDEA is a NASA- EPA-NOAA partnership to improve air quality assessment, management, and prediction by infusing (NASA) satellite measurements into (EPA, NOAA) analyses for public benefit. The IDEA web-based analysis, forecast, and visualization system is hosted at the NOAA Center of Satellite Applications and Research (STAR)

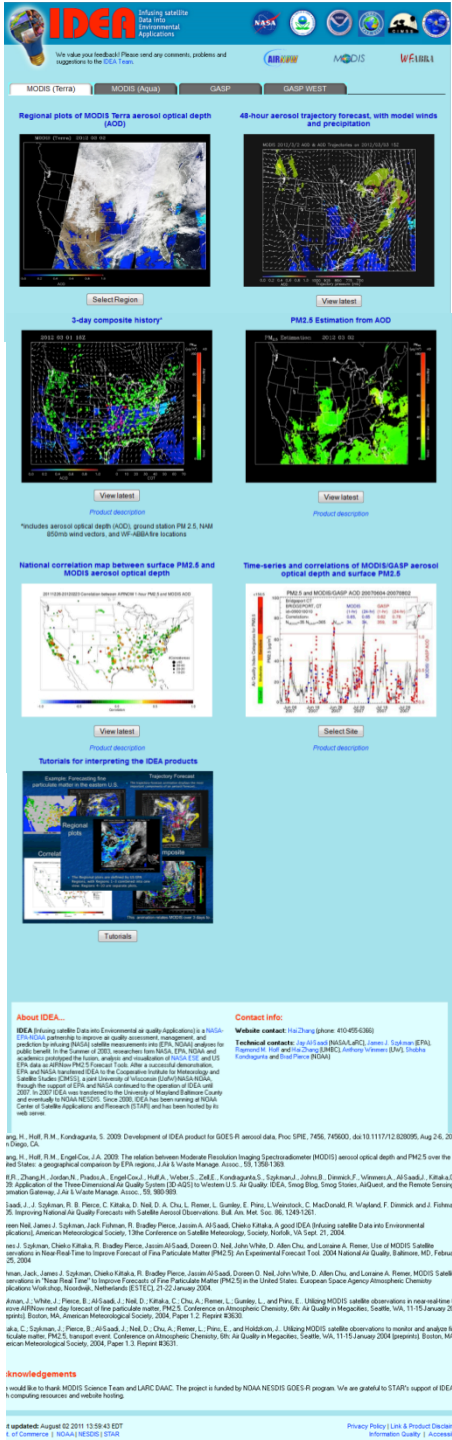
Originally Prepared by
R. Bradley Pierce
NOAA/NESDIS/STAR

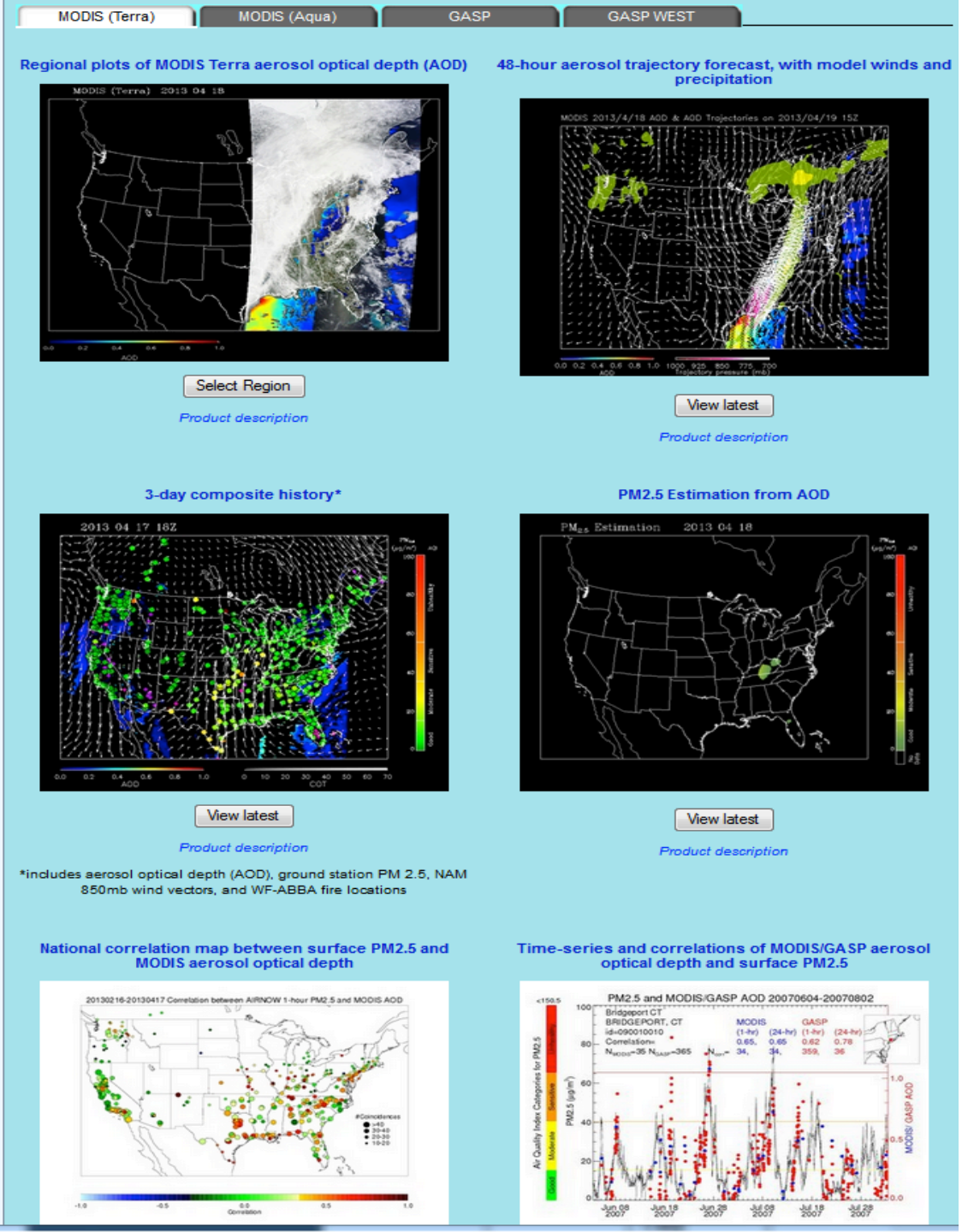
NASA MODIS - NOAA GOES-EPA AIRNow Data Fusion Improving EPA Air Quality Index (PM 2.5) Forecasting

http://www.star.nesdis.noaa.gov/smcd/spb/aq/index.php

Objective: Near-real-time product for State and Local Air Quality Forecasters

Goal: Improve accuracy of next day PM2.5 AQI forecast during large aerosol events

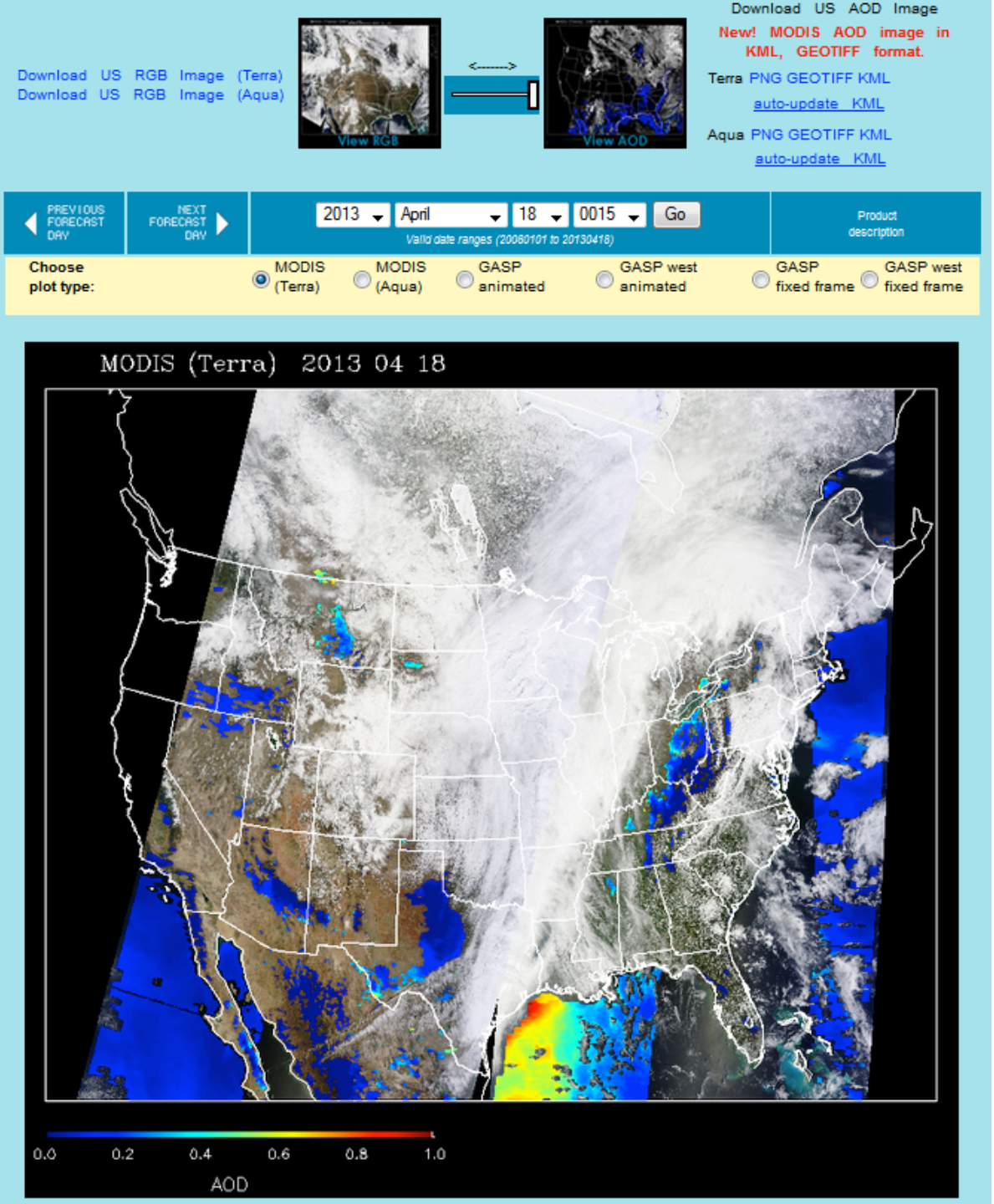




There are six sections to the site.

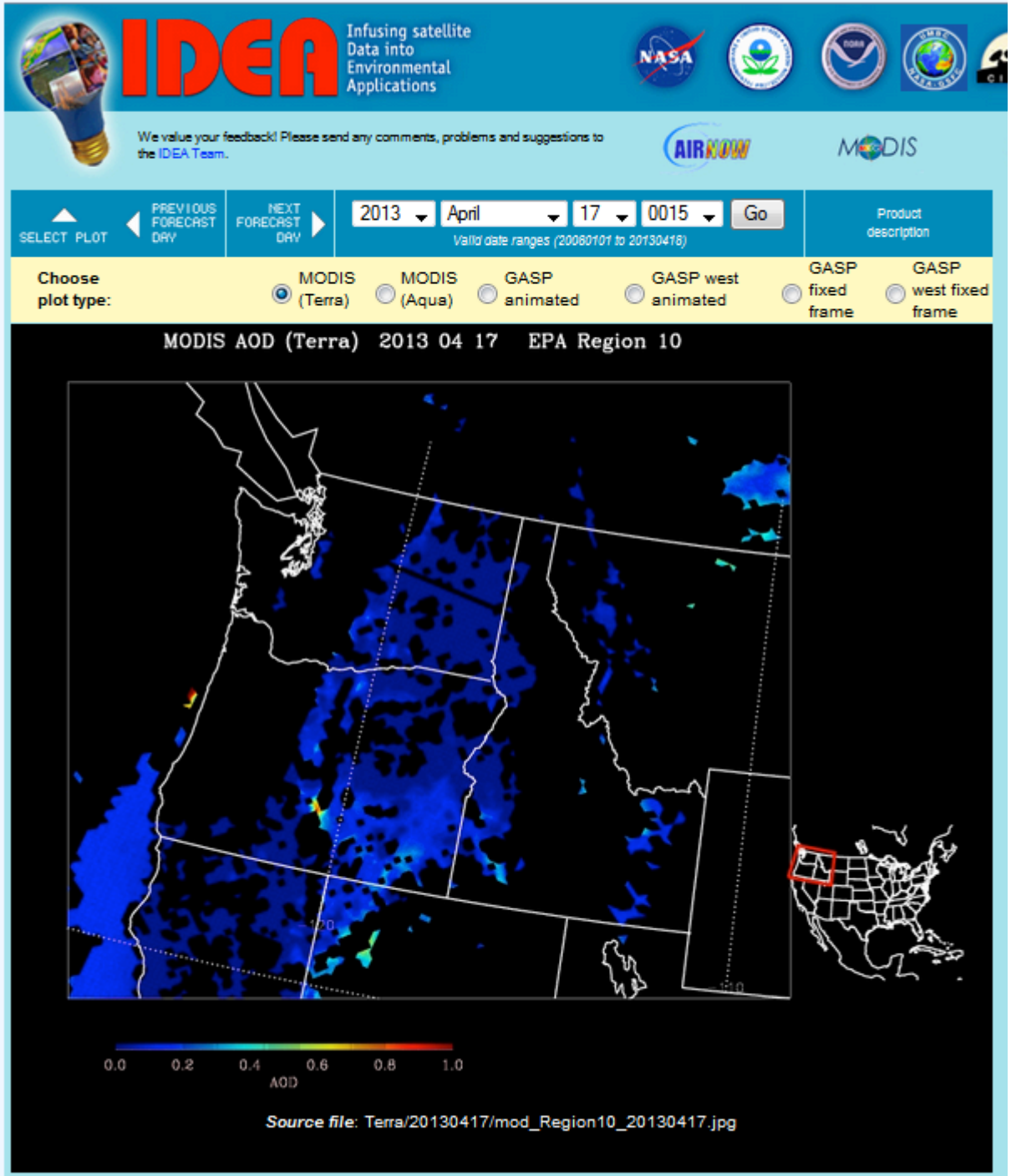
For each section you can select Terra, Aqua or GASP data.

GASP is the GOES aerosol product GASP is a geosynchronous satellite. Although it provides high temporal sampling the spectral range, spatial resolution and calibration accuracy are not as good as what MODIS provides.



The Regional Plots section allows you to zoom in on AOD in any one of the U.S. EPA Regions.

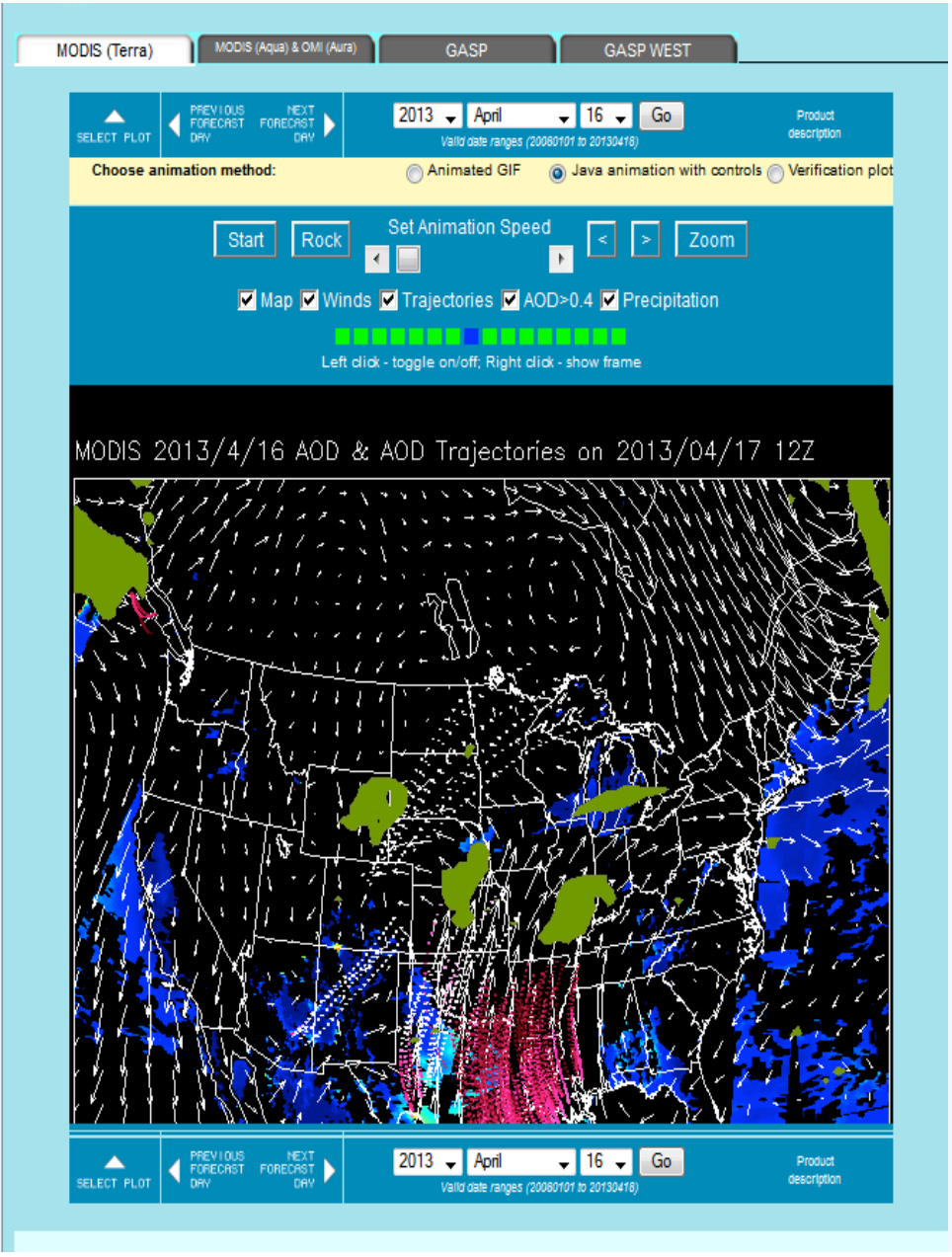
Prior to selecting the zoom region you can obtain images, animations and kml files for the entire U.S.



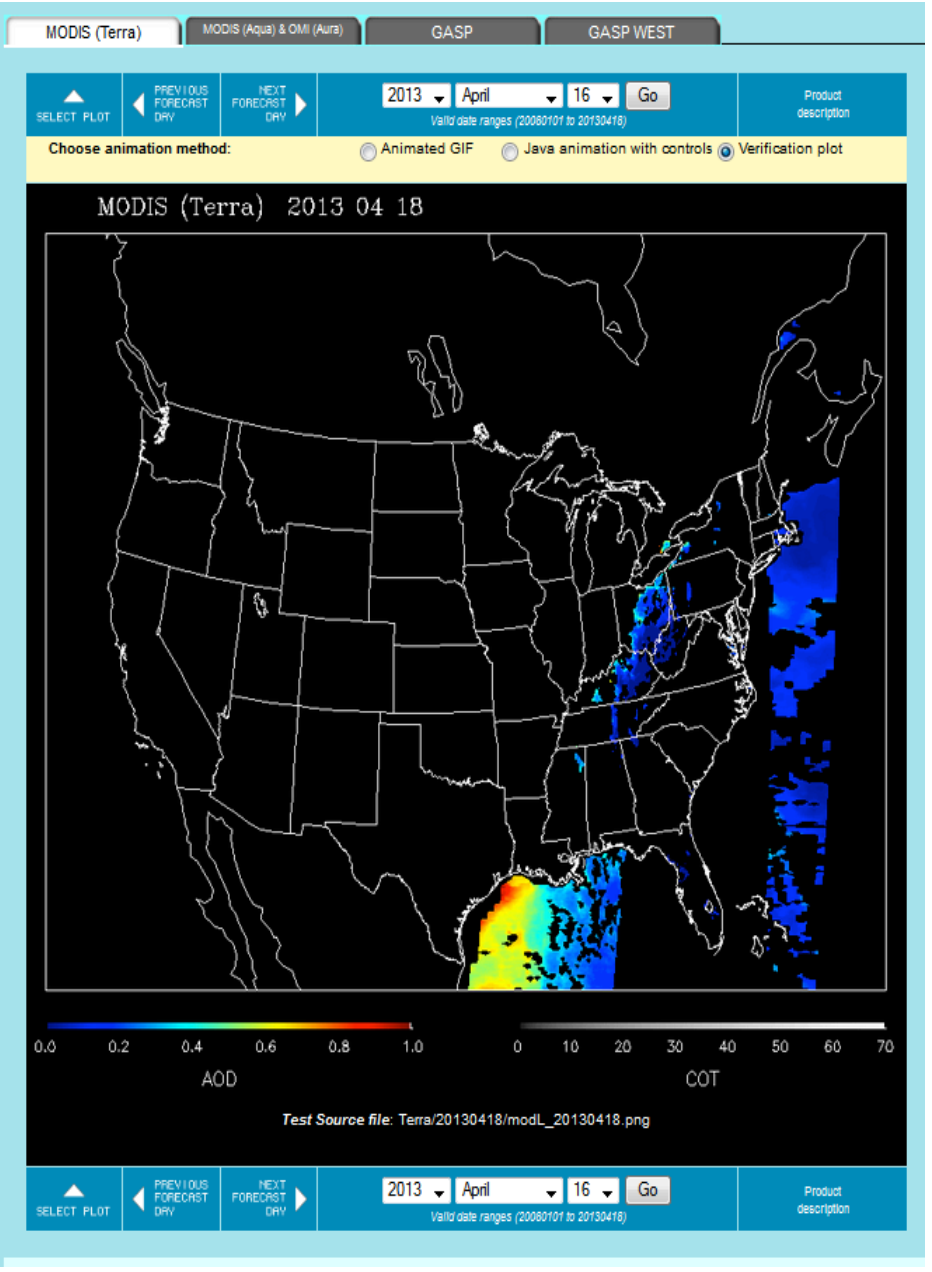
The Regional Plots section allows you to zoom in on AOD

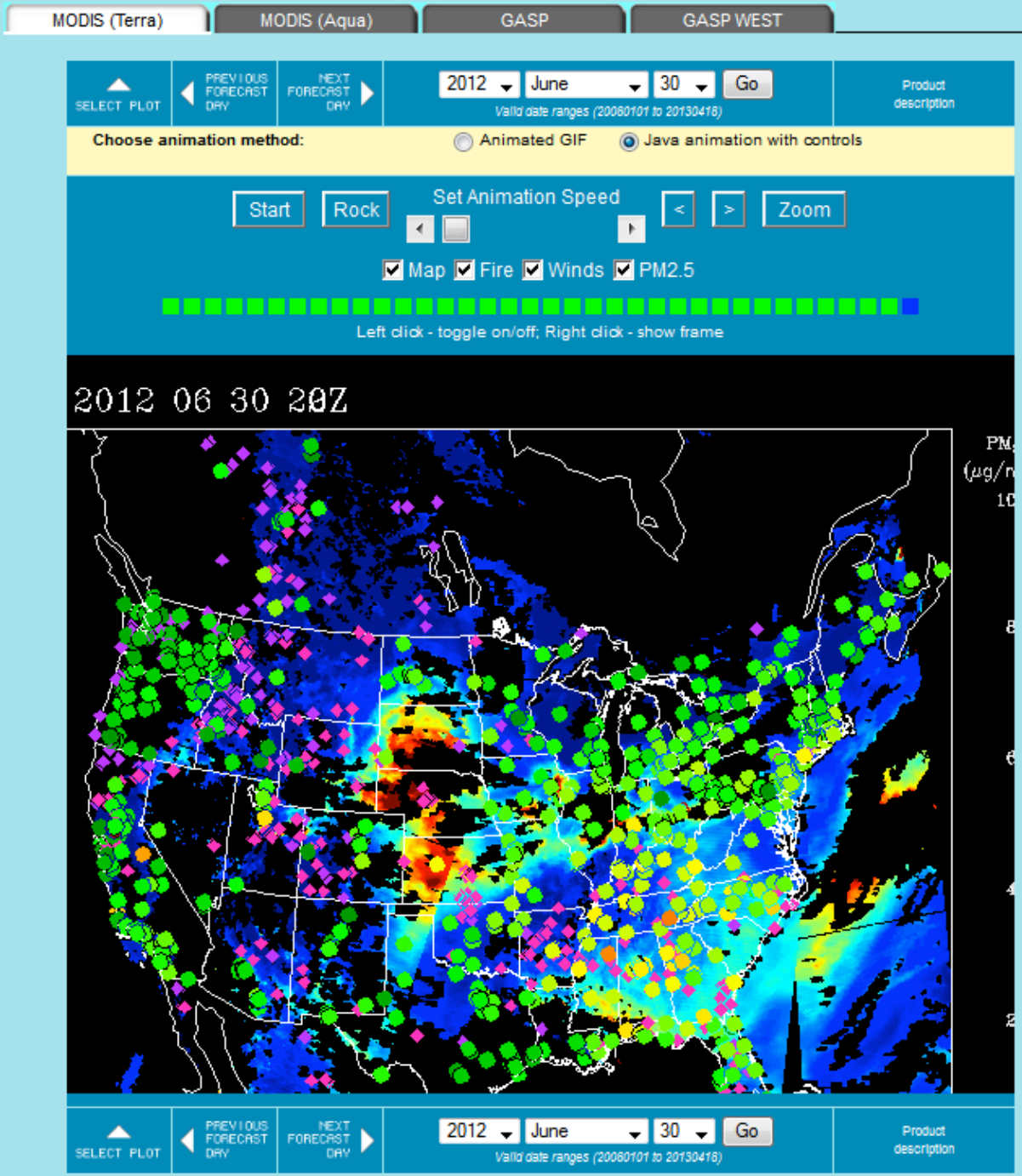
The 48 Hour Trajectory Panel

Animated trajectories of aerosol with winds



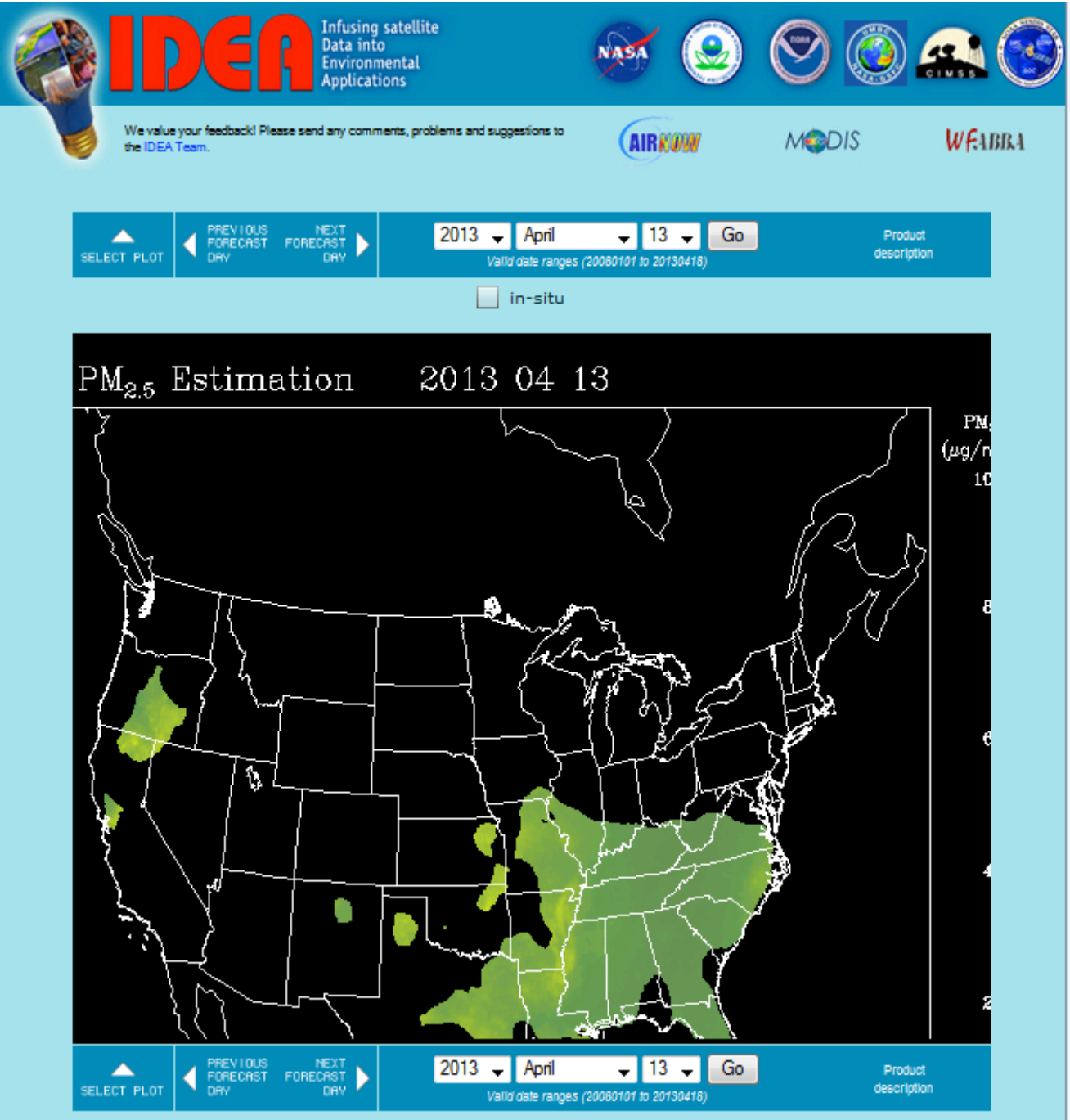
Verification plot of AOD 48 hours after start





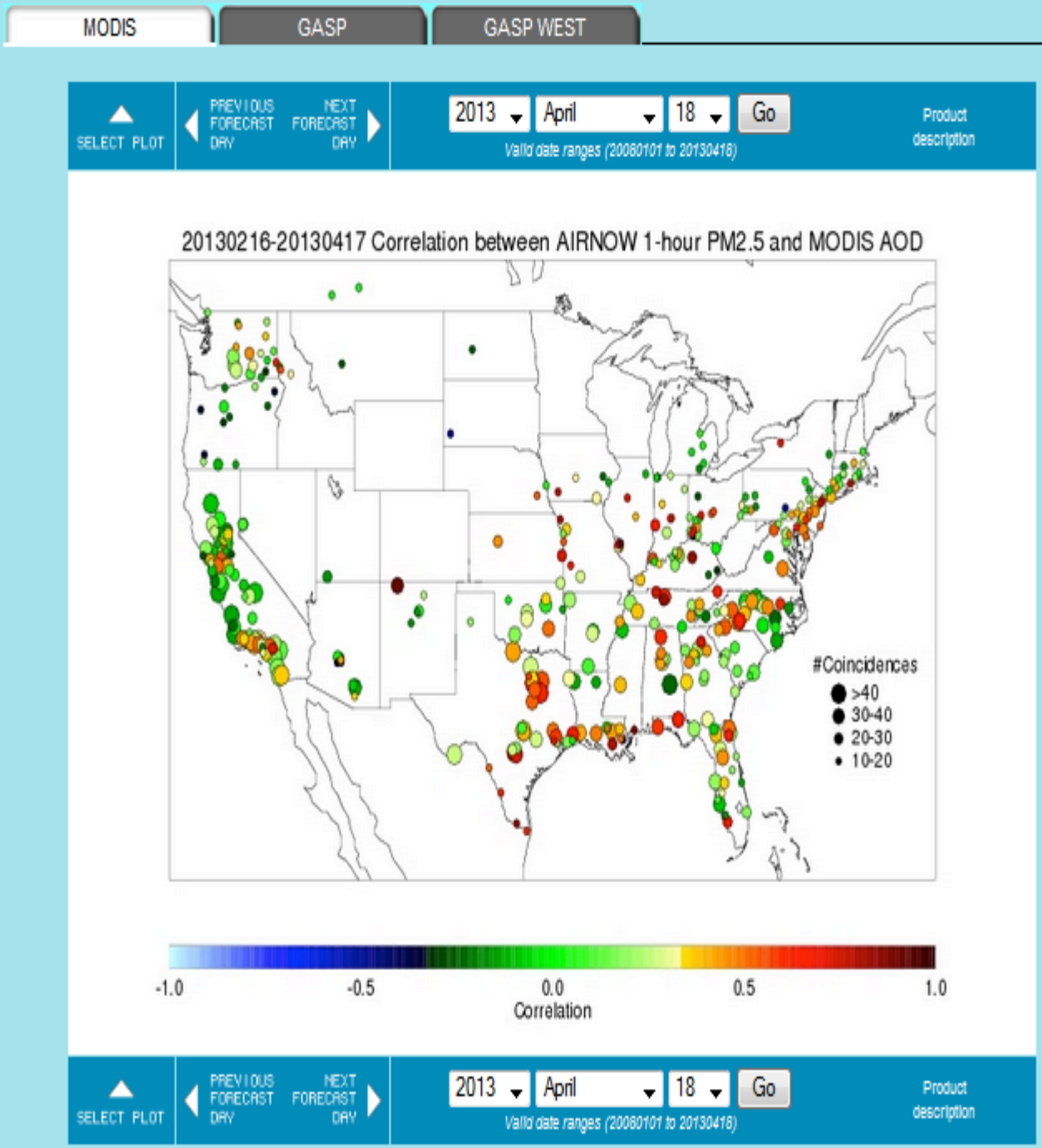
Three day composite history of AOD.

Also available are Winds, Fire and PM 2.5 ground measurements.



PM Estimation from AOD

This is a composite of estimate of ground level AOD using MODIS data only



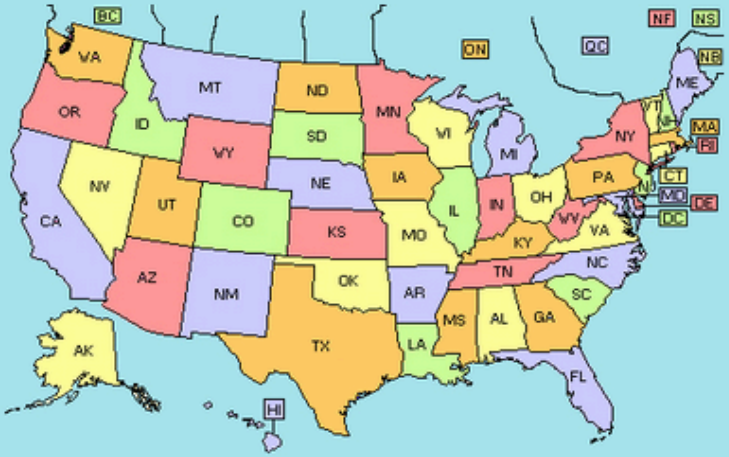
National Correlation Map Of PM and AOD

A 60 day correlation of MODIS AOD and ground level surface measurement (1 Hr) of PM 2.5

Utah

Metropolitan Statistical Area (MSA)	Site ID	Site description	Valid date ranges
0000 NOT IN AN MSA	490030003	Brigham City	20100516-20130417
	490050002	Logan #4	20030701-20060410
	490050004	Logan	20070307-20130417
	490530130	Zion NP	20090119-20130417
6520 PROVO-OREM, UT	490490002	North Provo	20100516-20130417
	490494001	Lindon - Provo	20030701-20130417
7160 SALT LAKE CITY-OGDEN, UT	490353006	Hawthorne	20030701-20130417
	490570002	Ogden #2	20030701-20130417

Select a State or Province



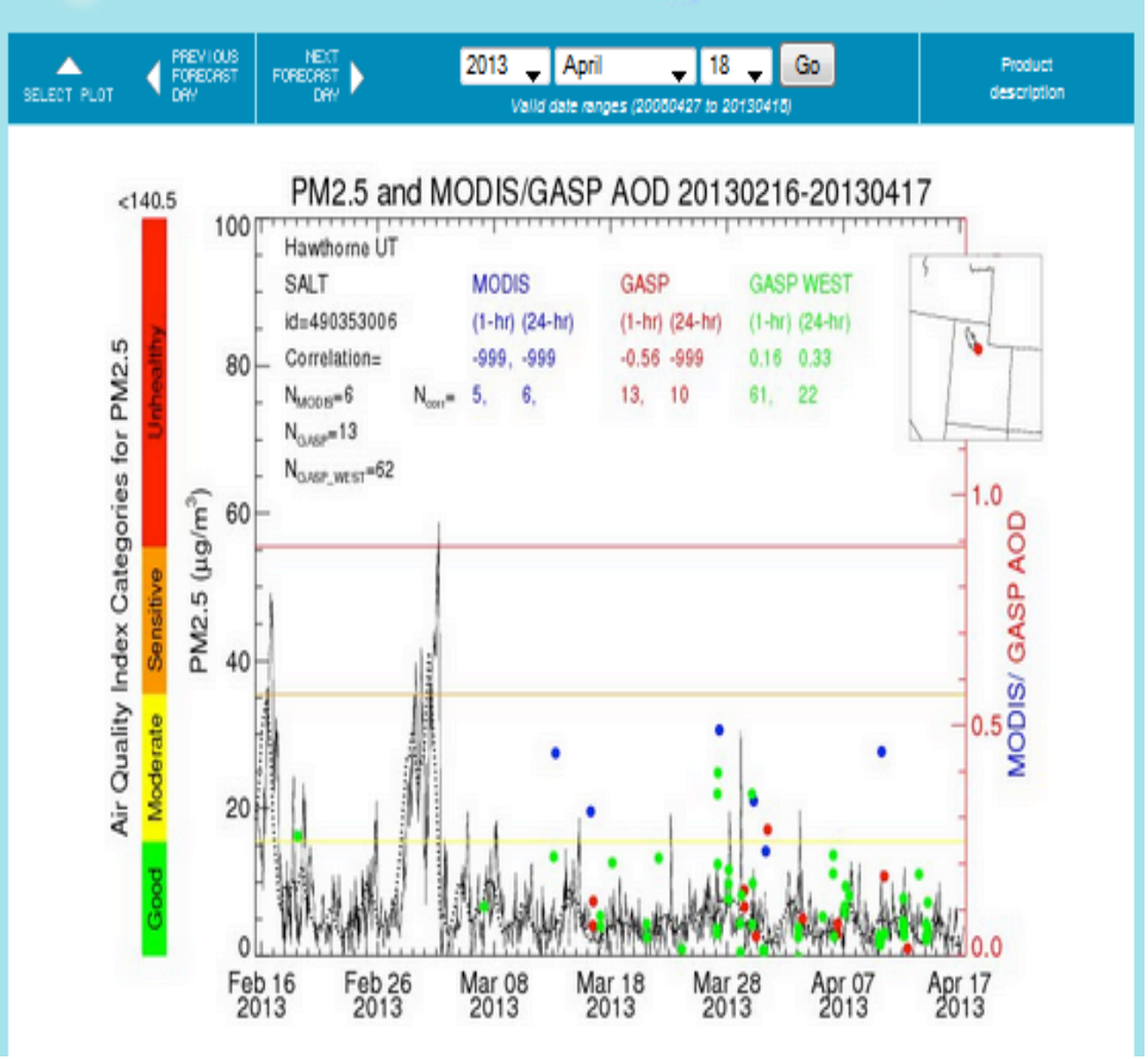
United States				Canada
Alabama	Illinois	Montana	Rhode Island	British Columbia
Alaska	Indiana	Nebraska	South Carolina	New Brunswick
Arizona	Iowa	Nevada	South Dakota	Newfoundland
Arkansas	Kansas	New Hampshire	Tennessee	Nova Scotia
California	Kentucky	New Jersey	Texas	Ontario
Colorado	Louisiana	New Mexico	Utah	Quebec
Connecticut	Maine	New York	Vermont	
Delaware	Maryland	North Carolina	Virginia	
District of Columbia	Massachusetts	North Dakota	Washington	
Florida	Michigan	Ohio	West Virginia	
Georgia	Minnesota	Oklahoma	Wisconsin	
Hawaii	Mississippi	Oregon	Wyoming	
Idaho	Missouri	Pennsylvania		

Select Plot

Time Series Plots

Selecting this section brings up a map of the U.S.

Click on any state to bring up a list (top of page) showing all available ground sites with data.



For a description of how to interpret the time series plots see the tutorial presentation on the IDEA website.

http://www.star.nesdis.noaa.gov/smcd/spb/aq/index.php?plot_type=tutorial&tut_type=sitCorr&tut_number=0

IDEA Tutorials

http://www.star.nesdis.noaa.gov/smcd/spb/aq/index.php?plot_type=tutorial

IDEA Homepage

http://www.star.nesdis.noaa.gov/smcd/spb/aq/

You can also access the data at

ftp://ftp.star.nesdis.noaa.gov/pub/smcd/hzhang/PM25SAT/

The data is 4 km in spatial resolution. The geolocation information is within the data files.

Please make open acknowledgement (data courtesy of NOAA/NESDIS/ STAR) when you use them.

http://asdp.airnowtech.org/maps.php

AIRNow SDP **About the Project** Outreach How the Process Works Experimental Maps

Welcome, Pawan Gupta Log Out | Contact Us

The AirNow Satellite Data Processor (ASDP) will be added to the current AirNow Information Management System (IMS; Dye et al., 2008) and will fuse NASA/NOAA satellite-estimated surface $PM_{2.5}$ concentrations with surface measurements to create new, contoured Air Quality Index (AQI) maps. The new AQI maps will provide pollutant information in monitor-sparse regions (**Figure 1**).

The U.S. Environmental Protection Agency's (EPA) AirNow program provides the public with easy access to national ambient air quality information using the AQI. The AQI is a standardized index for reporting air quality based on health effects for five major air pollutants: ground-level ozone, particulate matter ($PM_{2.5}$), carbon monoxide (CO), sulfur dioxide (SO_2), and nitrogen dioxide (NO_2). AirNow presents real-time hourly AQI conditions and daily AQI forecasts by interpolating AQI levels to a grid and creating maps that cover national, regional, and local spatial scales.

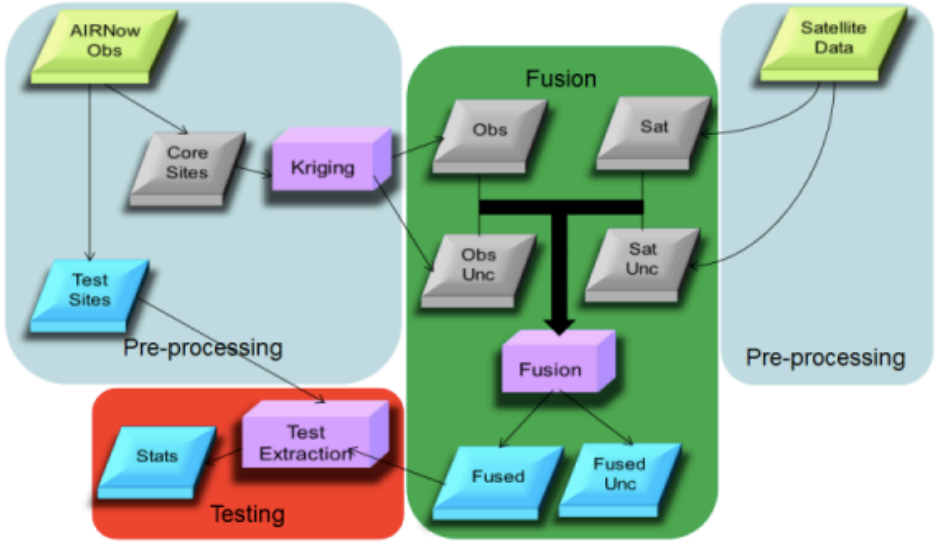


Figure 1. Flowchart describing the ASDP including the pre-processing steps, fusion, and testing modules (where obs = observation data, sat = satellite data, and unc = uncertainty).

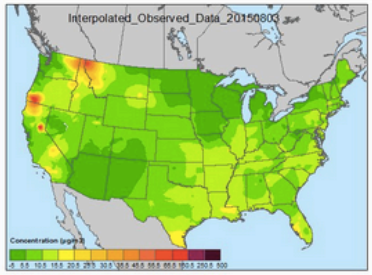
The production of AirNow AQI maps depends on the timely and accurate delivery of real-time air quality data on an hourly basis. However, significant gaps in the coverage of ground-based $PM_{2.5}$, ozone, and NO_2 monitors prevent complete nationwide mapping of pollutant concentrations in the U.S. When interpolated and contoured, AQI levels in regions far from monitors may have higher uncertainty.

Welcome, Pawan Gupta Log Out | Contact Us

Daily Estimated $PM_{2.5}$ Concentrations ($\mu g/m^3$) and Weights

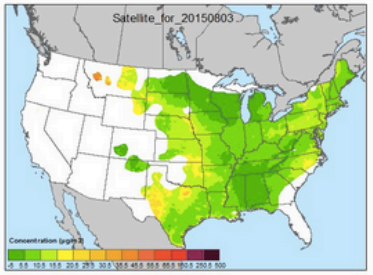
Fusion Method Weighted Average Date 2015-08-03 Test KMZ for 20150803 View Maps Show/Hide 6 Panels

Interpolated Observed Data



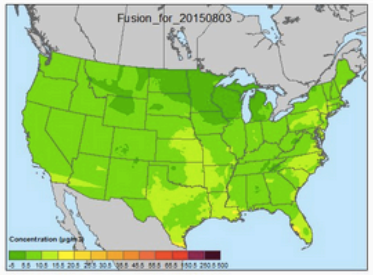
KML | JPG

Satellite-Estimated Data



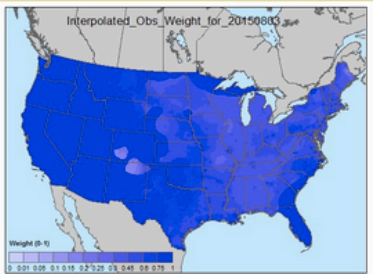
KML | JPG

Fused Data

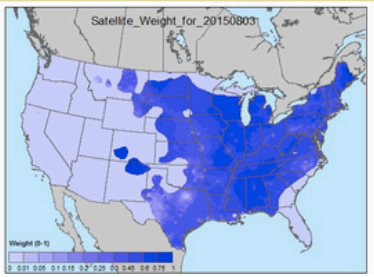
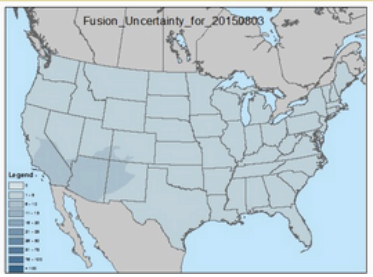


KML | JPG

Interpolated Observed Weights



Satellite-Estimated Weights



Fused Uncertainty